

Alternative Nonvolatile Residue Analysis with Contaminant Identification

Completed Technology Project (2014 - 2015)



Project Introduction

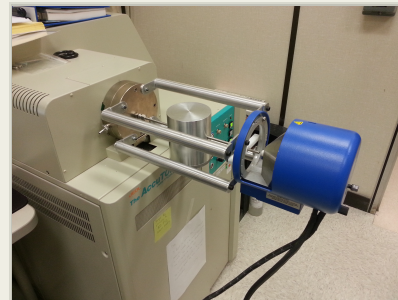
Cleanliness verification is required in numerous industries including spaceflight ground support, electronics, medical and aerospace. Currently at KSC, requirements for cleanliness verification use solvents that are environmentally unfriendly. The goal of this project is to produce an alternative cleanliness verification technique that is both environmentally friendly and more cost effective.

This purpose of this project is to develop an improved method for nonvolatile residue (NVR) analysis using the Direct Analysis in Real Time Mass Spectrometry (DART-MS). DART technology has been used for detection and identification of trace contaminants on a wide range of materials, from counterfeit pharmaceuticals to illicit drugs on paper currency. NVR is essentially a contaminant on flight hardware and as such, should be readily detectable via DART analysis. The primary challenge will be developing a means of sampling components with complex, three-dimensional geometries. Researchers will develop identification and quantitative analysis procedures to determine NVR levels for precision cleaned components. This project is in process and updates as to the progress will be submitted.

Anticipated Benefits

1. **Increased safety**
2. **Reduced environmental impacts**
3. **No harmful emissions or waste stream**
4. **Lower life cycle cost**
5. **Lower per sample costs**
6. **Provides quantification and ID in one step which will assist root cause analysis**
7. **Lower Processing time**

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Alternative NVR Chamber

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Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

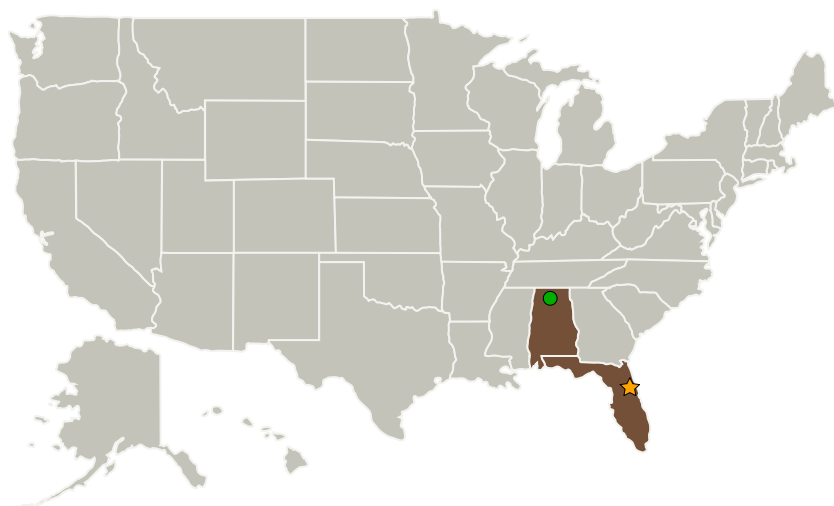
Center Independent Research & Development: KSC IRAD

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations

Alabama	Florida
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Project Management

Program Manager:

Barbara L Brown

Project Manager:

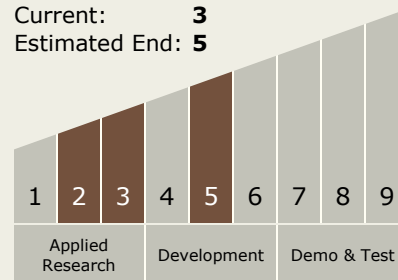
Nancy P Zeitlin

Principal Investigator:

Kathleen B Loftin

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 5



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - └ TX11.5 Mission Architecture, Systems Analysis and Concept Development
 - └ TX11.5.2 Tools and Methodologies for Performing Systems Analysis

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Images



Alternative NVR Sample Chamber

Alternative NVR Chamber
(<https://techport.nasa.gov/image/4061>)

Links

KSC-13988
(no url provided)